LPDES PERMIT NO. LA0054216, AI No. 3462

LPDES FACT SHEET and RATIONALE
FOR THE DRAFT LOUISIANA POLLUTANT DISCHARGE ELIMINATION SYSTEM
(LPDES) PERMIT TO DISCHARGE TO WATERS OF LOUISIANA

I. Company/Facility Name: Shell Chemical LP
St. Rose Refinery
Post Office Box 10
Norco, Louisiana 70079

II. Issuing Office: Louisiana Department of Environmental Quality (LDEQ)
Office of Environmental Services
Post Office Box 4313
Baton Rouge, Louisiana 70821-4313

III. Prepared By: Heather Babin
Industrial Water Permits Section
Water & Waste Permits Division
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Date Prepared: September 20, 2005

IV. Permit Action/Status:

A. Reason For Permit Action:

Proposed reissuance of an expired Louisiana Pollutant Discharge Elimination System (LPDES) permit for a 5-year term following regulations promulgated at LAC 33:IX.2711/40 CFR 122.46.

LAC 33:IX Citations: Unless otherwise stated, citations to LAC 33:IX refer to promulgated regulations listed at Louisiana Administrative Code, Title 33, Part IX.

40 CFR Citations: Unless otherwise stated, citations to 40 CFR refer to promulgated regulations listed at Title 40, Code of Federal Regulations in accordance with the dates specified at LAC 33:IX.4901, 4903, and 2301.F.

B. LPDES permit - LPDES permit effective date: March 1, 2001
LPDES permit expiration date: February 28, 2006
EPA has not retained enforcement authority.

C. Application received on August 26, 2005

V. Facility Information:

A. Location - 11842 River Road in St. Rose. Latitude 29°57'3.15", Longitude 90°19'42.58".

B. Applicant Activity - According to the application, Shell Chemical LP, St. Rose Refinery, is a small petroleum refinery whose principal products are light straight run gasoline, naptha, distillate oil, residual oil, kerosene, and gas oils. Products can be loaded and unloaded to marine vessels, tank trucks, and can also be shipped to Shell Chemicals LP in Norco, Louisiana via an underground pipeline.

C. Technology Basis - (40 CFR Chapter 1, Subchapter N/Parts 401-402, and 404-471 have been adopted by reference at LAC 33:IX.4903)

Guideline	Reference
Refinery Guidelines	40 CFR 419, Subpart A

Feedstock rate to Topping Unit(s), 1000 bbl/day - 53

Process Unit	Process Unit Rates, 1000 bbl/day
Crude Atmospheric Distillation	53
Crude Desalting	53
Crude Vacuum Distillation	23

Stormwater flow according to the application averages 21,834 gal/day.

Other sources of technology based limits:
LDEQ Stormwater Guidance, letter dated 6/17/87, from J. Dale Givens (LDEQ) to Myron Knudson (EPA Region 6).
Best Professional Judgement

D. Fee Rate -
1. Fee Rating Facility Type: *major*
2. Complexity Type: V
3. Wastewater Type: II
4. SIC code: 2911

E. Continuous Facility Effluent Flow - 0.175 MGD.

VI. Receiving Waters: Mississippi River (Outfall 001)

1. TSS (15%), mg/L: 25
2. Average Hardness, mg/L $CaCO_3$: 149.7
3. Critical Flow, cfs: 141955
4. Mixing Zone Fraction: 0.333
5. Harmonic Mean Flow, cfs: 366748
6. River Basin: Mississippi River, Segment No. 070301
7. Designated Uses:
   The designated uses are primary contact recreation, secondary contact recreation, fish and wildlife propagation, and drinking water supply.

Lake Pontchartrain (Outfall 002)

1. River Basin: Lake Pontchartrain, Segment No. 041201
   (Designated scenic stream and estuarine)
2. Designated Uses:
   The designated uses are primary contact recreation, secondary contact recreation, fish and wildlife propagation, and outstanding natural resources.

VII. Outfall Information:

Outfall 001

A. Type of wastewater -process wastewater and process area stormwater, boiler blowdown, water softener blowdown, sanitary wastewater, and tank draw water.

B. Location - Discharge to the Mississippi River at Latitude 29°56'19", Longitude 90°19'30".

C. Treatment of process wastewaters consists of:
- oil/water separator
- aeration
- clarification
- aerobic digestion
- sand filtration

D. Flow - Continuous Flow 0.175 MGD.

E. Receiving waters - Mississippi River

F. Basin and segment - Mississippi River Basin, Segment 070301

G. Effluent Data - The effluent data are contained in Appendix C.

Outfall 002

A. Type of wastewater - non-process area stormwater.

B. Location - Discharge to the an open ditch at Latitude 29°57'10", Longitude 90°19'41".

C. Treatment - None

D. Flow - Intermittent

E. Receiving waters - open ditch; thence into Lake Pontchartrain

F. Basin and segment -Lake Pontchartrain Basin, Segment 041201

VIII. Proposed Permit Limits:

The specific effluent limitations and/or conditions will be found in the draft permit. Development and calculation of permit limits are detailed in the Permit Limit Rationale section below.

Summary of Proposed Changes From the Current NPDES Permit:

A. Outfall 003 - has been deleted

B. Outfall 001 - Shell had requested that Chemical Oxygen Demand (COD) be removed as a sampling parameter because BOD_5 is a required parameter. This request has been denied based on the federal guidelines. Shell St. Rose has been permitted using New Source Performance Standards (NSPS) guidelines, these guidelines require the sampling of both COD and BOD_5.

C. Outfall 001 - the following parameters monitoring frequency have been reduced from 2/week to 1/month: TSS, Total Phenolics, and COD.

D. Outfall 001 - Biomonitoring frequency has been changed to once a year for both species.

IX. Permit Limit Rationale:

The following section sets forth the principal facts and the significant factual, legal, methodological, and policy questions considered in preparing the draft permit. Also set forth are any calculations or other explanations of the derivation of specific effluent limitations and conditions, including a citation to the applicable effluent limitation guideline or performance standard provisions as required under LAC 33:IX.2707/40 CFR Part 122.44 and reasons why they are applicable or an explanation of how the alternate effluent limitations were developed.

A. TECHNOLOGY-BASED VERSUS WATER QUALITY STANDARDS-BASED EFFLUENT LIMITATIONS AND CONDITIONS

Following regulations promulgated at LAC 33:IX.2707.L.2.b/40 CFR Part 122.44(l)(2)(ii), the draft permit limits are based on either technology-based effluent limits pursuant to LAC 33:IX.2707.A/40 CFR Part 122.44(a) or on State water quality standards and requirements pursuant to LAC 33:IX.2707.D/40 CFR Part 122.44(d), whichever are more stringent.

B. TECHNOLOGY-BASED EFFLUENT LIMITATIONS AND CONDITIONS

Regulations promulgated at LAC 33:IX.2707.A/40 CFR Part 122.44(a) require technology-based effluent limitations to be placed in LPDES permits based on effluent limitations guidelines where applicable, on BPJ (best professional judgement) in the absence of guidelines, or on a combination of the two. The following is a rationale for types of wastewaters. See outfall information descriptions for associated outfall(s) in Section VII.

1. Outfall 001 - Process Wastewaters

Shell Chemical LP, St. Rose Refinery is subject to Best Practicable Control Technology Currently Available (BPT) and Best Available Technology Economically Achievable (BAT) effluent limitation guidelines listed below:

Manufacturing Operation	Guideline
Refinery	40 CFR 419, Subpart A

Calculations and basis of permit limitations are found at Appendix A and associated appendices. See below for site-specific considerations.

2. Outfall 002 - Stormwater

Uncontaminated or low potential contaminated stormwater discharged through discrete outfall(s) not associated with process wastewater shall receive the following BPJ limitations in accordance with this Office's guidance on stormwater, letter dated 6/17/87, from J. Dale Givens (LDEQ) to Myron Knudson (EPA Region 6).

Parameter	Monthly Average mg/L	Daily Maximum mg/L
Flow, MGD	*Report*	*Report*
TOC	N/A	50
Oil and Grease	N/A	15
pH, Std. Units	6.0 (min)	9.0 (max)

In accordance with LAC 33:IX.2707.I.3 and 4 [40 CFR 122.44(I)(3) and (4)], a Part II condition is proposed for applicability to all storm water discharges from the facility, either through permitted outfalls or through outfalls which are not listed in the permit or as sheet flow. The Part II condition requires a Storm Water Pollution Prevention Plan (SWP3) within six (6) months of the effective date of the final permit, along with other requirements. If the permittee maintains other plans that contain duplicative information, those plans could be incorporated by reference to the SWP3. Examples of these type plans include, but are not limited to: Spill Prevention Control and Countermeasures Plan (SPCC), Best Management Plan (BMP), Response Plans, etc. The conditions will be found in the draft permit. Including Best Management Practice (BMP) controls in the form of a SWP3 is consistent with other LPDES and EPA permits regulating similar discharges of stormwater associated with industrial activity, as defined in LAC 33:IX.2522.B.14 [40 CFR 122.26(b)(14)].

C. WATER QUALITY-BASED EFFLUENT LIMITATIONS

Technology-based effluent limitations and/or specific analytical results from the permittee's application were screened against state water quality numerical standard based limits by following guidance procedures established in the Permitting Guidance Document for Implementing Louisiana Surface Water Quality Standards, LDEQ, September 27, 2001. Calculations, results, and documentation are given in Appendix B.

In accordance with LAC 33:IX.2707.D.1/40 CFR § 122.44(d)(1), the existing (or potential) discharge (s) was evaluated in accordance with the Permitting Guidance Document for Implementing Louisiana Surface Water Quality Standards, LDEQ, September 27, 2001, to determine whether pollutants would be discharged "at a level which will cause, have the reasonable potential to cause, or contribute to an excursion above any state water quality standard." Calculations, results, and documentation are given in Appendix B.

The following pollutants received water quality based effluent limits:

None

Minimum quantification levels (MQL's) for state water quality numerical standards-based effluent limitations are set at the values listed in the Permitting Guidance Document for Implementing Louisiana

Surface Water Quality Standards, LDEQ, September 27, 2001. They are also listed in Part II of the permit.

TMDL Waterbody

Outfall 001

The discharge from Outfall 001 is to the Mississippi River, Sement No. 070301 which is not listed on the 2004 Integrated Report for any impairments.

Outfall 002

The discharge from outfall 002, non-process area stormwater, is to an open ditch; thence into Lake Pontchartrain, Segment No.041201. Segment No.041201 is listed on the 303(d) report as being impaired with Phosphorus, Nitrogen (Nitrate + Nitrite as N), and Organic enrichment/low DO. A TMDL is scheduled to be completed by March 2012. Due to the type and infrequent intermittent nature of the low contamination potential stormwater, and based on the evaluation of the effluent discharges and water quality analysis, it was determined that the facility does not have the potential to discharge the listed pollutants into the receiving water body, and it is not expected that the discharge will cause or contribute to the identified impairments.

D. Biomonitoring Requirements

It has been determined that there may be pollutants present in the effluent which may have the potential to cause toxic conditions in the receiving stream. The State of Louisiana has established a narrative criteria which states, "toxic substances shall not be present in quantities that alone or in combination will be toxic to plant or animal life." The Office of Environmental Services requires the use of the most recent EPA biomonitoring protocols.

Whole effluent biomonitoring is the most direct measure of potential toxicity which incorporates both the effects of synergism of effluent components and receiving stream water quality characteristics. Biomonitoring of the effluent is, therefore, required as a condition of this permit to assess potential toxicity. The biomonitoring procedures stipulated as a condition of this permit for Outfall(s) 001 are as follows:

TOXICITY TESTS	FREQUENCY
Acute static renewal 48-hour definitive toxicity test using Daphnia pulex	1/year
Acute static renewal 48-hour definitive toxicity test using fathead minnow (Pimephales promelas)	1/year

Toxicity tests shall be performed in accordance with protocols described in the latest revision of the "Methods for Measuring the Acute Toxicity of Effluents and Receiving Waters to Freshwater and Marine

Organisms." The stipulated test species are appropriate to measure the toxicity of the effluent consistent with the requirements of the State water quality standards. The biomonitoring frequency has been established to reflect the likelihood of ambient toxicity and to provide data representative of the toxic potential of the facility's discharge in accordance with regulations promulgated at LAC 33:IX.2715/40 CFR Part 122.48.

Results of all dilutions as well as the associated chemical monitoring of pH, temperature, hardness, dissolved oxygen, conductivity, and alkalinity shall be documented in a full report according to the test method publication mentioned in the previous paragraph. The permittee shall submit a copy of the first full report to the Office of Environmental Compliance. The full report and subsequent reports are to be retained for three (3) years following the provisions of Part III.C.3 of this permit. The permit requires the submission of certain toxicity testing information as an attachment to the Discharge Monitoring Report.

This permit may be reopened to require effluent limits, additional testing, and/or other appropriate actions to address toxicity if biomonitoring data show actual or potential ambient toxicity to be the result of the permittee's discharge to the receiving stream or water body. Modification or revocation of the permit is subject to the provisions of LAC 33:IX.3105/40 CFR 124.5. Accelerated or intensified toxicity testing may be required in accordance with Section 308 of the Clean Water Act.

Dilution Series

The permit requires five (5) dilutions in addition to the control (0% effluent) to be used in the toxicity tests. These additional effluent concentrations shall be 0.008%, 0.006%, 0.004%, 0.003%, and 0.002%. The low-flow effluent concentration (critical dilution) is defined as 0.006% effluent.

E. MONITORING FREQUENCIES

Regulations require permits to establish monitoring requirements to yield data representative of the monitored activity [LAC 33:IX.2715/40 CFR 122.48(b)] and to assure compliance with permit limitations [LAC 33:IX.2707.I./40 CFR 122.44(I)]. The following section(s) explain the rationale for the monitoring frequencies stated in the draft permit.

1. Outfall 001 - Process Wastewaters

Flow and pH shall be monitored continuously. The following pollutants are to be monitored 1/month.

Parameter(s):
BOD_5
TSS
Oil & Grease
COD
Ammonia (as N)
Sulfide (as S)
Total Phenols

Those toxic pollutants indicated as being discharged well below the proposed draft permit limits are proposed to monitored 1/quarter.

Parameter(s):
Total Chromium
Chromium (6+)

2. Outfall 002 - Stormwater

Non-process area stormwater that is uncontaminated or has a low potential of contamination and is discharged at a discrete outfall, will receive monitoring frequencies according to the following schedule:

All parameters - 1/month, when discharging

X. Compliance History/DMR Review: a review of DMRs from January 1, 2003 through July 31, 2005 showed the following exceedance.

Date	Parameter	Outfall	Reported Value	Permit Limits
10/31/2004	pH (continuous)	001	1	> 60 minutes

XI. Endangered Species:

The receiving waterbody, Subsegment 070301 of the Mississippi River Basin, has been identified by the U.S. Fish and Wildlife Service (FWS) as habitat for the Pallid Sturgeon, which are listed as an endangered species. LDEQ has not submitted this draft permit to the FWS for review in accordance with a letter dated 10/21/05 from Watson (FWS) to Gautreaux (LDEQ). As set forth in the Memorandum of Understanding between the LDEQ and the FWS, and based on information provided by the FWS, LDEQ has determined that the issuance of the LPDES permit is not likely to have an adverse effect upon the Pallid Sturgeon. Effluent limitations are established in the permit to ensure protection of aquatic life and maintenance of the receiving water as aquatic habitat. The more stringent of technology and water quality based limits (as applicable) have been applied to ensure maximum protection of the receiving water.

XII. Historic Sites:

The discharge is from an existing facility location, which does not include an expansion on undisturbed soils. Therefore, there should be no potential effect to sites or properties on or eligible for listing on the National Register of Historic Places, and in accordance with the "Memorandum of Understanding for the Protection of Historic Properties in Louisiana Regarding LPDES Permits" no consultation with the Louisiana State Historic Preservation Officer is required.

XIII. Tentative Determination:

On the basis of preliminary staff review, the Department of Environmental Quality has made a tentative determination to reissue a permit for the discharge described in the application.

XIV. Variances:

No requests for variances have been received by this Office.

XV. Public Notices:

Upon publication of the public notice, a public comment period shall begin on the date of publication and last for at least 30 days thereafter. During this period, any interested persons may submit written comments on the draft permit and may request a public hearing to clarify issues involved in the permit decision at this Office's address on the first page of the fact sheet. A request for a public hearing shall be in writing and shall state the nature of the issues proposed to be raised in the hearing.

Public notice published in:

Local newspaper of general circulation

Office of Environmental Services Public Notice Mailing List

Appendix A

Calculation of Technology Based Limits for Shell Chemical LP - St. Rose Refinery

Out. 001

Refinery Guidelines, 40 CFR 419, New Source Only

TABLE 1

Spreadsheet:	refnew.wk4
Developer:	Bruce Fielding
Software:	Lotus 4.0
Revision date:	10/18/01
Calculation Date:	*09/20*

DATA INPUT:

		(*5)	
(*1)		*Conversion Utilities:*	
FACILITY INFORMATION		mg/L-->lbs/day	8.34
Permittee:	Shell Chemical LP - St. Ros	gpm-->MGD	0.00144
Permit Number:	*LA0054216, AI3462*	*gpm-->X gal/day*	*1.44*
Appendix	Appendix A-1	ft3-->gal	7.480519
Concentration flow, (MGD)		inches-->feet	0.083333
		acres-->sq. ft.	*43560*
Outfall number:	Out. 001		
40 CFR 419 Subpart, (A, B, C, D, or E):	a		
Refinery Type: (Topping, Cracking, Petrochemical, Lube, or Integragted	Topping		
(*2) THROUGHPUT RATES	K bbl/day		
Feedstock (Crude Oil and NGL) Rate to Topping Unit(s)	53		
Process Unit Rates	Input in Table 2		
(*3) *FLOW RATES*	X *gal/day* *gpm*		
Ballast Flow	---		
Stormwater Calculations:	sq. feet acres		
Process area, sq. ft. (or acres):	---		
Number of Days (Default is 365):			
Annual rainfall, inches	inches % runoff		
	K gal/day		
Contaminated Stormwater to Treatment System	21.834		
(*4) RATIOS:	Ratio:		
TOC:BOD5 (Default is 2.2, if needed):			
(*5) Discharge fraction, default =1	Fraction: 1		

Calculation of Technology Based Limits for Shell Chemical LP - St. Rose Refinery

Out. 001

Calculation of Unit Process Rates and Unit Configuration Factors

TABLE 2

(*1)	(*2)	(*3)	(*4)	(*5)	(*6)	(*7)
				Unit Process Rate		
		Unit		to		Unit
	EPA	Process	Total	Feedstock	Process	Process
	Process	Rate	Feedstock	Rate	Weighting	Config.
	Number	K bbl/day	Rate	Ratio *	Factor =	Factor
CRUDE PROCESSES:						
Atmospheric Crude Distillation	1	53	53	1	1	1
Crude Desalting	2	53	53	1	1	1
Vacuum Crude Distillation	3	23	53	0.433962	1	0.433962
CRACKING AND COKING PROCESSES:						
Visbreaking	4	0	53	0	6	0
Thermal Cracking	5	0	53	0	6	0
Fluid Catalytic Cracking	6	0	53	0	6	0
Moving Bed Catalytic Cracking	7	0	53	0	6	0
Hydrocracking	10	0	53	0	6	0
Delayed Coking	15	0	53	0	6	0
Fluid Coking	16	0	53	0	6	0
Hydroprocessing (Upstream Feedstock- Hydrotreating)	54	0	Not Applicable to Refinery Process Config. Factor			
LUBE PROCESSES:						
Hydrofining, Hydrofinishing, Lube Hydrofinishing	21	0	53	0	13	0
White Oil Manufacture	22	0	53	0	13	0
Propane: Dewaxing, Deasphalting, Fractioning, Deresining	23	0	53	0	13	0
Duo Sol, Solvent Treating, Solvent Extraction, Duotreating, Solvent Dewaxing, Solvent Deasphalt	24	0	53	0	13	0
Lube Vacuum Tower, Oil Fractionation, Batch Still (Naphtha Strip), Bright Stock Treating	25	0	53	0	13	0
Centrifuge and Chilling	26	0	53	0	13	0
Dewaxing: MEK, Ketone, MEK-Toluene	27	0	53	0	13	0
Deoiling (Wax)	28	0	53	0	13	0
Naphthenic Lube Production	29	0	53	0	13	0
SO2 Extraction	30	0	53	0	13	0
Wax Pressing	34	0	53	0	13	0
Wax Plant (with Neutral Separation)	35	0	53	0	13	0
Furfural Extracting	36	0	53	0	13	0
Clay Contacting - Percolation	37	0	53	0	13	0
Wax Sweating	38	0	53	0	13	0
Acid Treating	39	0	53	0	13	0
Phenol Extraction	40	0	53	0	13	0

Calculation of Technology Based Limits for Shell Chemical LP - St. Rose Refinery

Out. 001

Calculation of Unit Process Rates, Unit Configuration, Process and Size Factors

TABLE 2 (continued)

(*1)	(*2)	(*3)	(*4)	(*5)	(*6)	(*7)
				Unit Process Rate		
	EPA Process Number	Unit Process Rate K bbl/day	Total Feedstock Rate	to Feedstock Rate Ratio *	Weighting Factor =	Unit Process Config. Factor
ASPHALT PROCESSES:						
Asphalt Production	18	0	53	0	12	0
200 Deg. F Softening Point Unfluxed Asphalt	32	Not Applicable to Refinery Process Config. Factor				
Asphalt Oxidizing	43	0	53	0	12	0
Asphalt Emulsifying	89	0	53	0	12	0
REFORMING AND ALKYLATION PROCESSES:						
H2SO4 Alkylation	8	Not Applicable to Refinery Process Config. Factor				
Catalytic Reforming	12	Not Applicable to Refinery Process Config. Factor				

TOTAL REFINERY PROCESS CONFIGURATION FACTOR= 2.43

TABLE 3

PROCESS FACTORS BY SUBPART

Total Refinery Process Configuration	Topping Subpart A
< 2.49	0.62
2.5 to 3.49	0.67
3.5 to 4.49	0.8
4.5 to 5.49	0.95
5.5 to 5.99	1.07
6.0 to 6.49	1.17
6.5 to 6.99	1.27
7.0 to 7.49	1.39
7.5 to 7.99	1.51
8.0 to 8.49	1.64
8.5 to 8.99	1.79
9.0 to 9.49	1.95
9.5 to 9.99	2.12
10.0 to 10.49	2.31
10.5 to 10.99	2.51
11.0 to 11.49	2.73
11.5 to 11.99	2.98
12.0 to 12.49	3.24
12.5 to 12.99	3.53
13.0 to 13.49	3.84
13.5 to 13.99	4.18
>=14.00	4.36

TABLE 4

SIZE FACTORS BY SUBPART

K bbl/day Feedstock (Stream Day)	Topping Subpart A
< 24.9	1.02
25.0 to 49.9	1.06
50.0 to 74.9	1.16
75.0 to 99.9	1.26
100.0 to 124.9	1.38
125.0 to 149.9	1.5
150.0 to 174.9	1.57
175.0 to 199.9	1.57
200.0 to 224.9	1.57
>=225.0	1.57

PROCESS FACTOR INPUTS:

Refinery Configuration = 2.43

SIZE FACTOR INPUTS:

Feedstock, K bbl/day = 53

	FACTOR	REFERENCE
PROCESS FACTOR =	0.62	419.16(b)
SIZE FACTOR =	1.16	419.16(b)

Multiplier = Feedstock * Process Factor * Size Factor

Multiplier = 38.1176

Calculation of Technology Based Limits for Shell Chemical LP - St. Rose Refinery

Out. 001

Conventional, nonconventional, and toxic refinery pollutant loading calculations

TABLE 5

40 CFR 419, Petroleum and Refining Guidelines

(*1)	(*2)	(*3)	(*4)	(*5)	(*6)	(*7)	(*8)	(*9)
	REFERENCES:		FACTORS:				LOADINGS:	
PROCESS WASTEWATER	Subpart A Category:	Treatmt.	Topping Subpart A lb/K bbl	Topping Subpart A lb/K bbl		Discharge Fraction Through Outfall	Topping Subpart A lb/day	Topping Subpart A lb/day
PARAMETER	Topping	Tech.	Avg	Max	Multiplier		Avg	Max
Conventional:								
BOD5	419.16(a)	NSPS	2.2	4.2	38.1176	1	83.85872	160.0939
TSS	419.16(a)	NSPS	1.9	3	38.1176	1	72.42344	114.3528
Oil and Grease	419.16(a)	NSPS	0.7	1.3	38.1176	1	26.68232	49.55288
Nonconventional:								
COD	419.16(a)	NSPS	11.2	21.7	38.1176	1	426.9171	827.1519
TOC	---	---	---	---	38.1176	1	---	---
Ammonia	419.16(a)	NSPS	0.45	1	38.1176	1	17.15292	38.1176
Sulfide	419.16(a)	NSPS	0.012	0.027	38.1176	1	0.457411	1.029175
Total Phenolics	419.16(a)	NSPS	0.016	0.031	38.1176	1	0.609882	1.181646
Metals:								
Chromium (Total)	419.16(a)	NSPS	0.037	0.064	38.1176	1	1.410351	2.439526
Chromium (6+)	419.16(a)	NSPS	0.0025	0.0052	38.1176	1	0.095294	0.198212

			Topping Subpart A	Topping Subpart A		Discharge Fraction Through	Topping Subpart A	Topping Subpart A
BALLAST WATER	Subpart A Category: Topping	Treatmt. Tech.	lb/K gal Avg	lb/K gal Max	K gal/day	Flow Outfall	lb/day Avg	lb/day Max
PARAMETER								
Conventional								
BOD5	419.16(c)	NSPS	0.21	0.4	---	---	---	---
TSS	419.16(c)	NSPS	0.17	0.27	---	---	---	---
Oil and Grease	419.16(c)	NSPS	0.067	0.126	---	---	---	---
Nonconventional								
COD	419.16(c)	NSPS	2	3.9	---	---	---	---
TOC	---	---	---	---	---	---	---	---

Conventional, nonconventional, and toxic refinery pollutant loading calculations

TABLE 5 (continued)

40 CFR 419, Petroleum and Refining Guidelines

(*1)	(*2)	(*3)	(*4)	(*5)	(*6)	(*7)	(*8)	(*9)
			Topping Subpart	Topping Subpart		Discharge Fraction	Topping Subpart	Topping Subpart
STORMWATER	Subpart A		A	A		Through	A	A
	Category:	Treatmt.	lb/K gal	lb/K gal		Flow Outfall	lb/day	lb/day
PARAMETER	Topping	Tech.	Avg	Max	K gal/day		Avg	Max
Conventional								
BOD5	419.14(e)	BCT	0.22	0.4	21.834	1	4.80348	8.7336
TSS	419.14(e)	BCT	0.18	0.28	21.834	1	3.93012	6.11352
Oil and Grease	*419.14(e)*	*BCT*	*0.067*	*0.13*	21.834	1	*1.462878*	*2.83842*
Nonconventional								
COD	419.13(f)	BAT	1.5	3	21.834	1	32.751	65.502
TOC	---	---	---	---	21.834	1	---	---
Total Phenolics	419.13(f)	BAT	0.0014	0.0029	21.834	1	0.030568	0.063319
Metals								
Chromium (Total)	419.13(f)	BAT	0.0018	0.005	21.834	1	0.039301	0.10917
Chromium (6+)	419.13(f)	BAT	*0.00023*	*0.00052*	21.834	1	*0.005022*	*0.011354*

TABLE 6

TOTAL ALLOCATIONS (Process WW + Ballast Water + Contaminated SW) lbs/day

	PROCESS WASTEWATER		BALLLAST WATER		STORMWATER		TOTAL ALLOCATION	
	(*1)	(*2)	(*3)	(*4)	(*5)	(*6)	(*7)	(*8)
	Topping Subpart A	Topping Subpart A	Topping Subpart A	Topping Subpart A	Topping Subpart A	Topping Subpart A	Topping Subpart A	Topping Subpart A
	lb/day	lb/day	lb/day	lb/day	lb/day	lb/day	lb/day	lb/day
PARAMETER	Avg	Max	Avg	Max	Avg	Max	Avg	Max
Conventional								
BOD5	83.85872	160.0939	---	---	4.80348	8.7336	89	169
TSS	72.42344	114.3528	---	---	3.93012	6.11352	76	120
Oil and Grease	26.68232	49.55288	---	---	1.462878	2.83842	28	52
Nonconventional								
COD	426.9171	827.1519	---	---	32.751	65.502	460	893
TOC	---	---	---	---	---	---	---	---
Ammonia	17.15292	38.1176	---	---	---	---	17	38
Sulfide	0.457411	1.029175	---	---	---	---	0.46	1.03
Total Phenolics	*0.609882*	*1.181646*	---	---	*0.030568*	*0.063319*	*0.64*	*1.24*
Metals								
Chromium (Total)	*1.410351*	*2.439526*	---	---	*0.039301*	*0.10917*	*1.45*	*2.55*
Chromium (6+)	0.095294	0.198212	---	---	0.005022	0.011354	0.10	0.21

APPENDIX A-2 LA0054216, AI No. 3462

Documentation and Explanation of Technology Calculations
and Associated Lotus Spreadsheet

This is a technology spreadsheet covering the effluent guidelines for petroleum refining, 40 CFR 419, for new sources. The refinery guidelines consists of 5 Subparts; Supbart A-Topping, Subpart B-Cracking, Subpart C-Petrochemical, Subpart D-Lube, and Subpart E-Integrated. Treatment technologies consist of New Source Performance Standards (NSPS), Best Available Technology Economically Achievable (BAT), and Best Conventional Technology (BCT). BAT and BCT are assumed to equal NSPS if there are no NSPS factors stated in the guidelines. The term "Daily Average" as it is used in this documentation and in the spreadsheet is assumed to be equivalent to "Monthly Average". The spreadsheet is set up in a table and column/section format. Each table represents a general category for data input or calculation points. Each reference column or section is marked by a set of parentheses enclosing a number and asterisk, for example (*1) or (*8). These columns or sections represent inputs, existing data sets, calculation points, or results for determining technology based limits for an effluent of concern.

Introductory Notes to Petroleum Refining Effluent Limitations Calculations:

Regulatory Basis

Unless otherwise stated, the technology-based permit effluent limitations presented in this appendix are calculated using national effluent limitations and standards listed at 40 CFR Part 419 - Petroleum Refining Point Source Category. Technical data supporting the national effluent limitations and standards for the Petroleum Refining Point Source Category will be found at the following development documents:

1974 Development Document

Development Document for Effluent Limitations Guidelines and New Source Performance Standards for the Petroleum Refining Point Source Category, USEPA, EPA-44011-74-014a, April 1974

1982 Development Document

Development Document for Effluent Limitations Guidelines and New Source Performance Standards for the Petroleum Refining Point Source Category, USEPA, EPA 440/1-82/014, October 1982

Example Calculations

Example calculations for deriving petroleum refining permit effluent limitations will be found at:

40 CFR

Part 419.42(a)(3)
Part 419.43(c)(2)

Development Documents

1974 Development Document (Section IX, Pages 148-151)
1982 Development Document (Section I, Pages 1-14)

1985 Guidance

Guide for the Application of Effluent Limitations Guidelines for the Petroleum Refining Industry, USEPA, Industrial Technology Division, June 1985

Discussion of EPA Refining Processes Used in Calculations

Crude Processes	EPA Process Number
Atmospheric Crude Distillation	1
Crude Desalting	2
Vacuum Crude Distillation	3
Cracking and Coking Processes	
Visbreaking	4
Thermal Cracking	5
Fluid Catalytic Cracking	6
Moving Bed Catalytic Cracking	7
Hydrocracking	10
Delayed Coking	15
Fluid Coking	16
Hydrotreating*	54
Lube Processes	
Hydrofining, Hydrofinishing, Lube Hydrofinishing	21
White Oil Manufacture	22
Propane: Dewaxing, Deasphalting, Fractioning, Derinsing	23
Duo Sol, Solvent Treating, Solvent Extraction Duotreating, Solvent Dewaxing, Solvent Deasphalt	24
Lube Vacuum Tower, Oil Fractionation, Batch Still (Naphtha Strip), Bright Stock Treating	25
Centrifuge & Chilling	26
Dewaxing: MEK, Ketone, MEK-Toluene	27
Deoiling (Wax)	28
Naphthenic Lube Production	29
SO2 Extraction	30
Wax Pressing	34
Wax Plant (with Neutral Separation)	35
Furfural Extracting	36
Clay Contacting - Percolation	37
Wax Sweating	38
Acid Treating	39
Phenol Extraction	40
Asphalt Processes	

Asphalt Production	18
200 Deg. F Softening Point Unfluxed Asphalt*	32
Asphalt Oxidizing	43
Asphalt Emulsifying	89
Reforming and Alkylation Processes	
H2SO4 Alkylation*	8
Catalytic Reforming*	12

* These processes are not used in New Source Performance Standards calculations.

EPA Process Numbers will be found at Appendix A to 40 CFR 419. They can be cross-referenced in Table III-7, pages 49-54 of the 1982 Development Document.

Refining processes used in Table 2 (except as noted) lead to the calculation of process wastewater allocations in Table 5. The Table 2 refining processes are listed at Section IX, Table 51, page 151, of the 1974 Development Document. A detailed discussion of the refining processes used in the refinery process configuration factor (Table 2) is found in the "1974" Flow Model at Section IV, pages 55-62, of the 1974 Development Document and at Section IV, pages 63-65 of the 1982 Development Document. Also see "Process Groupings Included in 1974 Flow Model" at page 19 of the 1985 Guidance. Because certain petroleum refining processes [Hydrotreating; 200 Deg. F Softening Point Unfluxed Asphalt; H2SO4 Alkylation; and Catalytic Reforming] were not included in the 1974 flow model, they are not included as a process in the refinery process configuration factor calculations (Table 2). In 1976, the U.S. Court of Appeals upheld the 1974 BPT and NSPS regulations [see discussion at Section IV, pages 61-62, of the 1982 Development Document]. Refining processes not included in the 1974 Flow Model are not considered in the refinery process configuration factor calculations (Table 2).

Organizations or individuals desiring the inclusion of other refining processes in the previously mentioned calculations should petition the U.S. Environmental Protection Agency under the Administrative Procedures Act, 5-U.S.C. Sec. 553(e), which authorizes interested parties to petition the issuance, amendment, or repeal of a rule.

Table 1

Table 1 is a data input area.

(*1) Facility Information

Generalized input information for the facility:

Permittee- Permittee name.

Permit Number- LPDES permit number.

Concentration flow, (MGD)- If concentration limits are desired, then a flow for determining concentration limits is placed here.

Outfall number: Generally written as an abbreviation, e.g., "Out. 001".

40 CFR 419 Subpart, (A, B, C, D, or E): The subpart that the spreadsheet uses is specified by putting the designated subpart letter in the indicated cell. Input can be in either lower case or upper case.

Refinery type: The spreadsheet automatically specifies the refinery type, Topping, Cracking, Petrochemical, Lube, or Integrated based on the subpart specified.

(*2) Throughput Rates

Feedstock (Crude Oil and NGL) Rate to Topping Unit(s): As defined in the guidelines, the term "feedstock" shall mean the crude oil and natural gas liquids (NGL) fed to the topping unit(s).

Process Unit Rates: These values are input in Table 2 on the row indicating the specific process under the column labeled, "Unit Process Rate K bbl/day."

(*3) Flow Rates

Ballast Flow, K gal/day: As defined in the guidelines, "ballast" shall mean the flow of waters, from a ship, that is treated along with refinery wastewaters in the main treatment system. Units as specified.

Stormwater Calculations: The refinery effluent guidelines give an allowance for contaminated runoff. This is calculated using an areal estimate of the process area in either square feet or acres and an annual rainfall estimate in inches.

Process area, sq. ft. (or acres): The process area size is specified in the cell with the appropriate units.

Annual rainfall, inches: Estimate of annual rainfall as specified.

Contaminated stormwater to Treatment System: No value is input here, this is the calculated value utilizing the process area size and amount of rainfall specified above.

(*4) TOC:BOD5. TOC to BOD5 Ratio. A TOC to BOD5 ratio of 2.2 to 1 is established on a BPJ basis consistent with EPA Region 6 and the refinery effluent guidelines.

(*5) Discharge fraction, default =1: If the process wastewater is not discharged at 100% through the regulated outfall, then the fraction that is discharged through the regulated outfall is placed here. Examples

where a facility may split a process flow include, deep well injection, POTW's, other facilities, etc. This is in accordance with 40 CFR 122.50/LAC 33:IX.2717.

(*6) Conversion Utilities:

This section contains useful conversions for calculations throughout the spreadsheet.

Table 2

Table 2 calculates the total refinery process configuration factor by summing all contributing unit process configuration factors.

(*1) Specifies refinery processes under 5 different categories, crude processes, cracking and coking processes, lube processes, asphalt processes, and reforming and alkylation processes.

(*2) EPA process number. From Table III-7, Pages 49-54, Final Development Document for Effluent Limitations Guidelines and Standards for the Petroleum Refining Point Source Category, EPA 440/1-82/014, October, 1982.

(*3) Unit Process Rate, K bbl/day. Process rate is placed on the row with the specified process.

(*4) Total Feedstock Rate, K bbl/day. This column contains the value specified in section (*2) of Table 1.

(*5) Unit Process Rate to Feedstock Rate Ratio. The unit process rate is divided by the feedstock rate specified in column (*4).

(*6) Weighting factor. The spreadsheet uses the weighting factors specified at 40 CFR 419.42(b)(3), Subpart D.

(*7) Unit process configuration factor. The product in this column is the result of multiplying the "Unit Process Rate to Feedstock Rate Ratio" in column (*5) times the weighting factor specified in column (*6). These values are summed to obtain the total refinery process configuration factor.

Tables 3 and 4

Tables 3 and 4 calculate the process and size factors respectively. The input for determining the appropriate process factor is the total refinery process configuration factor. The input for determining the appropriate size factor is the feedstock in K bbl/day. The multiplier used in determining mass loadings for certain parameters specified in Table 6 is determined by multiplying the feedstock times the process factor times the size factor.

Table 5

Table 5 is where mass loadings are calculated for each parameter under each applicable wastewater type; process, ballast, and stormwater (contaminated).

(*1) Parameter.

(*2) References. 40 CFR reference applicable to the specified factors and subparts in columns (*4) and (*5).

(*3) Treatmt. Tech. Applicable treatment technology, BPT, BCT, or BPT, for the parameter and factors specified.

(*4) Factor, Avg. Daily average (daily maximum 30-day average) factors specified in the guidelines.

(*5) Factor, Max. Daily maximum factors specified in the guidelines.

(*6) Multiplier/Table 2 Group Feedstock Rate, K bbl/day/Flow K gal/day. For the process wastewater, this column contains the multiplier calculated under Tables 3 and 4 or the applicable group feedstock rate from Table 2 in 1000 barrels per day (K bbl/day). For ballast and stormwater, flow in 1000 gallons per day from the data input table, Table 1.

(*7) Discharge fraction through outfall. This column contains the factor calculated in section (*4) of Table 1.

(*8) Daily average (daily maximum 30-day average) loadings in lbs per day for the specified parameter under the specified subpart.

(*9) Daily maximum loadings in lbs per day for the specified parameter under the specified subpart.

Table 6

Table 6 is a data summary table totaling the allocations from process wastewater, ballast water, and contaminated stormwater. The total values represent the refinery effluent guideline limitations.

(*1) Process wastewater daily average (daily maximum 30-day average) loadings in lbs per day for the specified parameter under the specified subpart.

(*2) Process wastewater daily maximum loadings in lbs per day for the specified parameter under the specified subpart.

(*3) Ballast water daily average (daily maximum 30-day average) loadings in lbs per day for the specified parameter under the specified subpart.

(*4) Ballast water daily maximum loadings in lbs per day for the specified parameter under the specified subpart.

(*5) Contaminated stormwater daily average (daily maximum 30-day average) loadings in lbs per day for the specified parameter under the specified subpart.

(*6) Contaminated stormwater daily maximum loadings in lbs per day for the specified parameter under the specified subpart.

(*7) Total daily average (daily maximum 30-day average) loadings in lbs per day for the specified parameter under the specified subpart.

(*8) Total daily maximum loadings in lbs per day for the specified parameter under the specified subpart.

Appendix B

Water Quality Screen for Shell Chemical LP - St. Rose Refinery

Input variables:

Receiving Water Characteristics:

Receiving Water Name=	Mississippi River
Critical flow (Qr) cfs=	141955
Harm. mean/avg tidal cfs=	366748
Drinking Water=1 HHNPCR=2	1
Marine, 1=y, 0=n	
Rec. Water Hardness=	149.7
Rec. Water TSS=	25
Fisch/Specific=1,Stream=0	
Diffuser Ratio=	

Effluent Characteristics:

Permittee=	Shell Chemical LP - St. Rose Refinery
Permit Number=	LA0054216, AI3462
Facility flow (Qef),MGD=	0.175
Outfall Number =	001
Eff. data, 2=lbs/day	2
MQL, 2=lbs/day	1
Effluent Hardness=	N/A
Effluent TSS=	N/A
WQBL ind. 0=y, 1=n	
Acute/Chr. ratio 0=n, 1=y	1
Aquatic,acute only1=y,0=n	

Page Numbering/Labeling

Appendix	Appendix B-1
Page Numbers 1=y, 0=n	1
Input Page # 1=y, 0=n	1

Fischer/Site Specific inputs:

Pipe=1,Canal=2,Specific=3	
Pipe width, feet	
ZID plume dist., feet	
MZ plume dist., feet	
HHnc plume dist., feet	
HHc plume dist., feet	

Fischer/site specific dilutions:

F/specific ZID Dilution =	---
F/specific MZ Dilution =	---
F/specific HHnc Dilution=	---
F/specific HHc Dilution=	---

Dilution:

ZID Fs =	0.033333
MZ Fs =	0.333333
Critical Qr (MGD)=	91745.52
Harm. Mean (MGD)=	237029.2
ZID Dilution =	0.000057
MZ Dilution =	0.000006
HHnc Dilution=	0.000002
HHc Dilution=	7.4E-007
ZID Upstream =	17475.34
MZ Upstream =	174753.4
MZhhnc Upstream=	524260.1
MZhhc Upstream=	1354453
ZID Hardness=	---
MZ Hardness=	---
ZID TSS=	---
MZ TSS=	---

Multipliers:

WLAa --> LTAa	0.32
WLAc --> LTAc	0.53
LTA a,c-->WQBL avg	1.31
LTA a,c-->WQBL max	3.11
LTA h --> WQBL max	2.38
WQBL-limit/report	2.13
WLA Fraction	1
WQBL Fraction	1

Conversions:

ug/L-->lbs/day Qef	0.00146
ug/L-->lbs/day Qeo	0
ug/L-->lbs/day Qr	1183.905
lbs/day-->ug/L Qeo	685.1662
lbs/day-->ug/L Qef	685.1662
diss-->tot 1=y0=n	1
Cu diss->tot1=y0=n	1
cfs-->MGD	0.6463

Receiving Stream:

Default Hardness=	25
Default TSS=	10
99 Crit., 1=y, 0=n	1

Toxicity Dilution Series:

Biomonitoring dilution:	0.000057
Dilution Series Factor:	0.75

	Percent Effluent
Dilution No. 1	0.008%
Dilution No. 2	0.0057%
Dilution No. 3	0.0043%
Dilution No. 4	0.0032%
Dilution No. 5	0.0024%

Partition Coefficients; Dissolved-->Total

METALS	FW
Total Arsenic	2.144682
Total Cadmium	3.632254
Chromium III	5.209157
Chromium VI	1
Total Copper	3.401584
Total Lead	6.330231
Total Mercury	2.847934
Total Nickel	2.955736
Total Zinc	4.28316

Aquatic Life, Dissolved Metal Criteria, ug/L

METALS	ACUTE	CHRONIC
Arsenic	339.8	150
Cadmium	49.23806	1.389057
Chromium III	763.6103	247.7073
Chromium VI	15.712	10.582
Copper	26.94809	17.34068
Lead	99.91352	3.893486
Mercury	1.734	0.012
Nickel	1991.218	221.1407
Zinc	161.091	147.1005

Site Specific Multiplier Values:

CV =	---
N =	---
WLAa --> LTAa	---
WLAc --> LTAc	---
LTA a,c-->WQBL avg	---
LTA a,c-->WQBL max	---
LTA h --> WQBL max	---

(*1)	(*2)	(*3)	(*4)	(*5)	(*6)	(*7)	(*8)	(*9)	(*10)	(*11)
Toxic	CuEffluent	Effluent		MQLEffluent	95th %		Numerical Criteria			HH
Parameters	Instream	/Tech	/Tech	1=No 95%	estimate		Acute	Chronic	HHDW	Carcinogen
	Conc.	(Avg)	(Max)	0=95 %	Non-Tech		FW	FW		Indicator
	ug/L	lbs/day	lbs/day	ug/L		lbs/day	ug/L	ug/L	ug/L	"C"
NONCONVENTIONAL										
Total Phenols (4AAP)				5			700	350	5	
3-Chlorophenol				10					0.1	
4-Chlorophenol	0.640449	1.244964		10	1		383	192	0.1	
2,3-Dichlorophenol				10					0.04	
2,5-Dichlorophenol				10					0.5	
2,6-Dichlorophenol				10					0.2	
3,4-Dichlorophenol				10					0.3	
2,4-Dichlorophenocy-acetic acid (2,4-D)				---					100	
2-(2,4,5-Trichlorophen-oxy) propionic acid (2,4,5-TP, Silvex)				---					10	
METALS AND CYANIDE										
Total Arsenic				10			728.7631	321.7024	107.2341	
Total Cadmium				1			178.8451	5.045408	36.32254	
Chromium III				10			3977.766	1290.346	260.4578	
Chromium VI				10			15.712	10.582	50	C
Total Copper				10			91.66617	58.98577	3401.584	
Total Lead	0.100316	0.209565		5	1		632.4757	24.64667	316.5116	
Total Mercury				0.2			4.938317	0.034175	5.695867	
Total Nickel				40			5885.515	653.6337		
Total Zinc	0.03			20	0	0.0639	689.9785	630.055	21415.8	
Total Cyanide				20			45.9	5.2	663.8	
DIOXIN										
2,3,7,8 TCDD; dioxin			1.0E-005						7.1E-007	C
VOLATILE COMPOUNDS										
Benzene				10			2249	1125	1.1	C
Bromoform				10			2930	1465	3.9	C
Bromodichloromethane				10					0.2	C
Carbon Tetrachloride				10			2730	1365	0.22	C
Chloroform				10			2890	1445	5.3	C
Dibromochloromethane				10					0.39	C
1,2-Dichloroethane				10			11800	5900	0.36	C
1,1-Dichloroethylene				10			1160	580	0.05	C
1,3-Dichloropropylene				10			606	303	9.86	
Ethylbenzene				10			3200	1600	2390	
Methyl Chloride				50			55000	27500		
Methylene Chloride				20			19300	9650	4.4	C
1,1,2,2-Tetrachloro-ethane				10			932	466	0.16	C

(*1) Toxic Parameters	(*12) WLAa Acute	(*13) WLAc Chronic	(*14) WLAh HHDW	(*15) LTAa Acute	(*16) LTAc Chronic	(*17) LTAh HHDW	(*18) Limiting A,C,HH	(*19) WQBL Avg 001	(*20) WQBL Max 001	(*21) WQBL Avg 001	(*22) WQBL Max 001	(*23) WQBL Need?
	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	lbs/day	lbs/day	
NONCONVENTIONAL												
Total Phenols (4AAP)	1.2E+007	6.1E+007	2621305	3914699	3.2E+007	2621305	2621305	2621305	6238707	3825.795	9105.393	no
3-Chlorophenol	---	---	52426.11	---	---	52426.11	52426.11	52426.11	124774.1	76.51591	182.1079	no
4-Chlorophenol	6693437	3.4E+007	52426.11	2141900	1.8E+007	52426.11	52426.11	52426.11	124774.1	76.51591	182.1079	no
2,3-Dichlorophenol	---	---	20970.44	---	---	20970.44	20970.44	20970.44	49909.66	30.60636	72.84314	no
2,5-Dichlorophenol	---	---	262130.5	---	---	262130.5	262130.5	262130.5	623870.7	382.5795	910.5393	no
2,6-Dichlorophenol	---	---	104852.2	---	---	104852.2	104852.2	104852.2	249548.3	153.0318	364.2157	no
3,4-Dichlorophenol	---	---	157278.3	---	---	157278.3	157278.3	157278.3	374322.4	229.5477	546.3236	no
2,4-Dichlorophenocy-acetic acid (2,4-D)	---	---	5.2E+007	---	---	5.2E+007	5.2E+007	5.2E+007	1.2E+008	76515.91	182107.9	no
2-(2,4,5-Trichlorophen-oxy) propionic acid (2,4,5-TP, Silvex)	---	---	5242611	---	---	5242611	5242611	5242611	1.2E+007	7651.591	18210.79	no
METALS AND CYANIDE												
Total Arsenic	1.3E+007	5.6E+007	5.6E+007	4075555	3E+007	5.6E+007	4075555	5338977	1.3E+007	7792.237	18499.13	no
Total Cadmium	3125558	881707.1	1.9E+007	1000179	467304.7	1.9E+007	467304.7	612169.2	1453318	893.461	2121.117	no
Chromium III	7E+007	2.3E+008	1.4E+008	2.2E+007	1.2E+008	1.4E+008	2.2E+007	2.9E+007	6.9E+007	42531.92	100972.7	no
Chromium VI	274588.2	1849251	6.8E+007	87868.22	980102.9	6.8E+007	87868.22	115107.4	273270.2	167.9992	398.8378	no
Total Copper	1601989	1E+007	1.8E+009	512636.4	5463251	1.8E+009	512636.4	671553.7	1594299	980.1327	2326.88	no
Total Lead	1.1E+007	4307113	1.7E+008	3537074	2282770	1.7E+008	2282770	2990429	7099414	4364.53	10361.6	no
Total Mercury	86303.69	5972.266	2986122	27617.18	3165.301	2986122	3165.301	4146.544	9844.086	6.051882	14.36744	no
Total Nickel	1E+008	1.1E+008	---	3.3E+007	6.1E+007	---	3.3E+007	4.3E+007	1E+008	62930.36	149399.6	no
Total Zinc	1.2E+007	1.1E+008	1.1E+010	3858655	5.8E+007	1.1E+010	3858655	5054838	1.2E+007	7377.535	17514.61	no
Total Cyanide	802163.8	908722.7	3.5E+008	256692.4	481623	3.5E+008	256692.4	336267.1	798313.5	490.7818	1165.138	no
DIOXIN												
2,3,7,8 TCDD; dioxin	---	---	0.961662	---	---	0.961662	0.961662	0.961662	2.288756	0.001404	0.00334	no
VOLATILE COMPOUNDS												
Benzene	3.9E+007	2E+008	1489899	1.3E+007	1E+008	1489899	1489899	1489899	3545960	2174.508	5175.329	no
Bromoform	5.1E+007	2.6E+008	5282370	1.6E+007	1.4E+008	5282370	5282370	5282370	1.3E+007	7709.619	18348.89	no
Bromodichloromethane	---	---	270890.8	---	---	270890.8	270890.8	270890.8	644720	395.3651	940.9688	no
Carbon Tetrachloride	4.8E+007	2.4E+008	297979.8	1.5E+007	1.3E+008	297979.8	297979.8	297979.8	709192	434.9016	1035.066	no
Chloroform	5.1E+007	2.5E+008	7178605	1.6E+007	1.3E+008	7178605	7178605	7178605	1.7E+007	10477.17	24935.67	no
Dibromochloromethane	---	---	528237	---	---	528237	528237	528237	1257204	770.9619	1834.889	no
1,2-Dichloroethane	2.1E+008	1E+009	487603.4	6.6E+007	5.5E+008	487603.4	487603.4	487603.4	1160496	711.6571	1693.744	no
1,1-Dichloroethylene	2E+007	1E+008	67722.69	6487216	5.4E+007	67722.69	67722.69	67722.69	161180	98.84126	235.2422	no
1,3-Dichloropropylene	1.1E+007	5.3E+007	5169214	3389011	2.8E+007	5169214	3389011	4439605	1.1E+007	6479.603	15382.87	no
Ethylbenzene	5.6E+007	2.8E+008	1.3E+009	1.8E+007	1.5E+008	1.3E+009	1.8E+007	2.3E+007	5.6E+007	34215.73	81229.7	no
Methyl Chloride	9.6E+008	4.8E+009	---	3.1E+008	2.5E+009	---	3.1E+008	4E+008	9.6E+008	588082.8	1396135	no
Methylene Chloride	3.4E+008	1.7E+009	5959597	1.1E+008	8.9E+008	5959597	5959597	5959597	1.4E+007	8698.031	20701.31	no
1,1,2,2-Tetrachloro-ethane	1.6E+007	8.1E+007	216712.6	5212143	4.3E+007	216712.6	216712.6	216712.6	515776	316.292	752.7751	no

(*1)	(*2)	(*3)	(*4)	(*5)	(*6)	(*7)	(*8)	(*9)	(*10)	(*11)
Toxic	CuEffluent		Effluent	MQL	Effluent	95th %	Numerical Criteria			HH
Parameters	Instream	/Tech	/Tech		1=No 95%	estimate	Acute	Chronic	HHDW	Carcinogen
	Conc.	(Avg)	(Max)		0=95 %	Non-Tech	FW	FW		Indicator
	ug/L	lbs/day	lbs/day	ug/L		lbs/day	ug/L	ug/L	ug/L	"C"
VOLATILE COMPOUNDS (cont'd)										
Tetrachloroethylene				10			1290	645	0.65	C
Toluene				10			1270	635	6100	
1,1,1-Trichloroethane				10			5280	2640	200	
1,1,2-Trichloroethane				10			1800	900	0.56	C
Trichloroethylene				10			3900	1950	2.8	C
Vinyl Chloride				10					1.9	C
ACID COMPOUNDS										
2-Chlorophenol				10			258	129	0.1	
2,4-Dichlorophenol				10			202	101	0.3	
BASE NEUTRAL COMPOUNDS										
Benzidine				50			250	125	0.00008	C
Hexachlorobenzene				10					0.00025	C
Hexachlorabutadiene				10			5.1	1.02	0.09	C
PESTICIDES										
Aldrin				0.05			3		0.00004	C
Hexachlorocyclohexane (gamma BHC, Lindane)				0.05			5.3	0.21	0.11	C
Chlordane				0.2			2.4	0.0043	0.00019	C
4,4'-DDT				0.1			1.1	0.001	0.00019	C
4,4'-DDE				0.1			52.5	10.5	0.00019	C
4,4'-DDD				0.1			0.03	0.006	0.00027	C
Dieldrin				0.1			0.2374	0.0557	0.00005	C
Endosulfan				0.1			0.22	0.056	0.47	
Endrin				0.1			0.0864	0.0375	0.26	
Heptachlor				0.05			0.52	0.0038	0.00007	C
Toxaphene				5			0.73	0.0002	0.00024	C
Other Parameters:										
Fecal Col.(col/100ml)										
Chlorine							19	11		
Ammonia	17.15292	37.73642			1			4000		
Chlorides										
Sulfates										
TDS										

(*1) Toxic Parameters	(*12) WLAa Acute	(*13) WLAc Chronic	(*14) WLAh HHDW	(*15) LTAa Acute	(*16) LTAc Chronic	(*17) LTAh HHDW	(*18) Limiting A,C,HH	(*19) WQBL Avg 001	(*20) WQBL Max 001	(*21) WQBL Avg 001	(*22) WQBL Max 001	(*23) Need WQBL?
	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	lbs/day	lbs/day	
Tetrachloroethylene	2.3E+007	1.1E+008	880394.9	7214232	6E+007	880394.9	880394.9	880394.9	2095340	1284.936	3058.149	no
Toluene	2.2E+007	1.1E+008	3.2E+009	7102383	5.9E+007	3.2E+009	7102383	9304122	2.2E+007	13579.37	32238.04	no
1,1,1-Trichloroethane	9.2E+007	4.6E+008	1E+008	3E+007	2.4E+008	1E+008	3E+007	3.9E+007	9.2E+007	56455.95	134029	no
1,1,2-Trichloroethane	3.1E+007	1.6E+008	758494.1	1E+007	8.3E+007	758494.1	758494.1	758494.1	1805216	1107.022	2634.713	no
Trichloroethylene	6.8E+007	3.4E+008	3792471	2.2E+007	1.8E+008	3792471	3792471	3792471	9026080	5535.111	13173.56	no
Vinyl Chloride	---	---	2573462	---	---	2573462	2573462	2573462	6124840	3755.968	8939.204	no
ACID COMPOUNDS												
2-Chlorophenol	4508895	2.3E+007	52426.11	1442846	1.2E+007	52426.11	52426.11	52426.11	124774.1	76.51591	182.1079	no
2,4-Dichlorophenol	3530220	1.8E+007	157278.3	1129670	9354601	157278.3	157278.3	157278.3	374322.4	229.5477	546.3236	no
BASE NEUTRAL COMPOUNDS												
Benzidine	4369084	2.2E+007	108.3563	1398107	1.2E+007	108.3563	108.3563	108.3563	257.888	0.158146	0.376388	no
Hexachlorobenzene	---	---	338.6134	---	---	338.6134	338.6134	338.6134	805.9	0.494206	1.176211	no
Hexachlorabutadiene	89129.32	178249.5	121900.8	28521.38	94472.21	121900.8	28521.38	37363.01	88701.5	54.53131	129.4598	no
PESTICIDES												
Aldrin	52429.01	---	54.17815	16777.28	---	54.17815	54.17815	54.17815	128.944	0.079073	0.188194	no
Hexachlorocyclohexane (gamma BHC, Lindane)	92624.58	36698.42	148989.9	29639.87	19450.16	148989.9	19450.16	25479.71	60490	37.18764	88.28516	no
Chlordane	41943.21	751.4438	257.3462	13421.83	398.2652	257.3462	257.3462	257.3462	612.484	0.375597	0.89392	no
4,4'-DDT	19223.97	174.7544	257.3462	6151.67	92.61981	257.3462	92.61981	121.332	288.0476	0.177084	0.420406	no
4,4'-DDE	917507.7	1834921	257.3462	293602.5	972508	257.3462	257.3462	257.3462	612.484	0.375597	0.89392	no
4,4'-DDD	524.2901	1048.526	365.7025	167.7728	555.7189	365.7025	167.7728	219.7824	521.7735	0.320772	0.761528	no
Dieldrin	4148.882	9733.818	67.72269	1327.642	5158.924	67.72269	67.72269	67.72269	161.18	0.098841	0.235242	no
Endosulfan	3844.794	9786.244	246402.7	1230.334	5186.71	246402.7	1230.334	1611.738	3826.339	2.352331	5.584542	no
Endrin	1509.955	6553.289	136307.9	483.1858	3473.243	136307.9	483.1858	632.9733	1502.708	0.923825	2.193202	no
Heptachlor	9087.695	664.0666	94.81176	2908.062	351.9553	94.81176	94.81176	94.81176	225.652	0.138378	0.329339	no
Toxaphene	12757.73	34.95087	325.0689	4082.472	18.52396	325.0689	18.52396	24.26639	57.60952	0.035417	0.084081	no
Other Parameters:												
Fecal Col. (col/100ml)	---	---	---	---	---	---	---	---	---	---	---	no
Chlorine	332050.4	1922298	---	106256.1	1018818	---	106256.1	139195.5	330456.6	203.1559	482.3013	no
Ammonia	---	7E+008	---	---	3.7E+008	---	3.7E+008	4.9E+008	1.2E+009	708336	1681622	no
Chlorides	---	---	---	---	---	---	---	---	---	---	---	no
Sulfates	---	---	---	---	---	---	---	---	---	---	---	no
TDS	---	---	---	---	---	---	---	---	---	---	---	no
	---	---	---	---	---	---	---	---	---	---	---	no
	---	---	---	---	---	---	---	---	---	---	---	no

APPENDIX B-2 LA0054216, AI No. 3462

Documentation and Explanation of Water Quality Screen
and Associated Lotus Spreadsheet

Each reference column is marked by a set of parentheses enclosing a number and asterisk, for example (*1) or (*19). These columns represent inputs, existing data sets, calculation points, and results for determining Water Quality Based Limits for an effluent of concern. The following represents a summary of information used in calculating the water quality screen:

Receiving Water Characteristics:

Receiving Water: Mississippi River
Critical Flow, Qrc (cfs): 141955
Harmonic Mean Flow, Qrh (cfs): 366748
Segment No.: 070301
Receiving Stream Hardness (mg/L): 149.7
Receiving Stream TSS (mg/L): 25
MZ Stream Factor, Fs: 0.333
Plume distance, Pf: N/A

Effluent Characteristics:

Company: Shell Chemical LP
Facility flow, Qe (MGD): 0.175
Effluent Hardness: N/A
Effluent TSS: N/A
Pipe/canal width, Pw: N/A
Permit Number: LA0054216

Variable Definition:
Qrc, critical flow of receiving stream, cfs
Qrh, harmonic mean flow of the receiving stream, cfs
Pf = Allowable plume distance in feet, specified in LAC 33.IX.1115.D
Pw = Pipe width or canal width in feet
Qe, total facility flow , MGD
Fs, stream factor from LAC.IX.33.11 (1 for harmonic mean flow)
Cu, ambient concentration, ug/L
Cr, numerical criteria from LAC.IX.1113, Table 1
WLA, wasteload allocation
LTA, long term average calculations
WQBL, effluent water quality based limit
ZID, Zone of Initial Dilution in % effluent
MZ, Mixing Zone in % effluent

Formulas used in aquatic life water quality screen (dilution type WLA):

Streams:

$$\text{Dilution Factor} = \frac{Qe}{(Qrc \times 0.6463 \times Fs + Qe)}$$

$$WLA\ a,c,h = \frac{Cr}{\text{Dilution Factor}} - \frac{(Fs \times Qrc \times 0.6463 \times Cu)}{Qe}$$

Static water bodies (in the absence of a site specific dilution):

Discharge from a pipe:

$$\text{Critical Dilution} = \frac{(2.8)\ Pw\ n^{1/2}}{Pf}$$

$$WLA = \frac{(Cr-Cu)\ Pf}{(2.8)\ Pw\ n^{1/2}}$$

Discharge from a canal:

$$\text{Critical Dilution} = \frac{(2.38)(Pw^{1/2})}{(Pf)^{1/2}}$$

$$WLA = \frac{(Cr-Cu)\ Pf^{1/2}}{2.38\ Pw^{1/2}}$$

Formulas used in human health water quality screen, human health non-carcinogens (dilution type WLA):

Streams:

$$\text{Dilution Factor} = \frac{Qe}{(Qrc \times 0.6463 + Qe)}$$

$$WLA\ a,c,h = \frac{Cr}{\text{Dilution Factor}} - \frac{(Qrc \times 0.6463 \times Cu)}{Qe}$$

Formulas used in human health water quality screen, human health carcinogens (dilution type WLA):

$$\text{Dilution Factor} = \frac{Qe}{(Qrh \times 0.6463 + Qe)}$$

$$WLA\ a,c,h = \frac{Cr}{\text{Dilution Factor}} - \frac{(Qrh \times 0.6463 \times Cu)}{Qe}$$

Static water bodies in the absence of a site specific dilution (human health carcinogens and human health non-carcinogens):

Discharge from a pipe:

$$\text{Critical Dilution} = \frac{(2.8)\ Pw\ n^{1/2}}{Pf}$$

$$WLA = \frac{(Cr-Cu)\ Pf^{*}}{(2.8)\ Pw\ n^{1/2}}$$

Discharge from a canal:

$$\text{Critical Dilution} = \frac{(2.38)(Pw^{1/2})}{(Pf)^{1/2}}$$

$$WLA = \frac{(Cr-Cu)\ Pf^{1/2*}}{2.38\ Pw^{1/2}}$$

* Pf is set equal to the mixing zone distance specified in LAC 33:IX.1115 for the static water body type, i.e., lake, estuary, Gulf of Mexico, etc.

If a site specific dilution is used, WLA are calculated by subtracting Cu from Cr and dividing by the site specific dilution for human health and aquatic life criteria.

$$WLA = \frac{(Cr-Cu)}{\text{site specific dilution}}$$

Longterm Average Calculations:
LTAa = WLAa X 0.32
LTAc = WLAc X 0.53
LTAh = WLAh

WQBL Calculations:
Select most limiting LTA to calculate daily max and monthly avg WQBL

If aquatic life LTA is more limiting:
Daily Maximum = Min(LTAa, LTAc) X 3.11
Monthly Average = Min(LTAc, LTAc) X 1.31

If human health LTA is more limiting:
Daily Maximum = LTAh X 2.38
Monthly Average = LTAh

Mass Balance Formulas:

mass (lbs/day): (ug/L) X 1/1000 X (flow, MGD) X 8.34 = lbs/day

$$\text{concentration(ug/L)}: \frac{\text{lbs/day}}{\text{(flow, MGD) X 8.34 X 1/1000}} = \text{ug/L}$$

The following is an explanation of the references in the spreadsheet.

(*1) Parameter being screened.
(*2) Instream concentration for the parameter being screened in ug/L. In the absence of accurate supporting data, the instream concentration is assumed to be zero (0).
(*3) Monthly average effluent or technolgy value in concentration units of ug/L or mass units of lbs/day. Units determined on a case-by-case basis as appropriate to the particular situation.
(*4) Daily maximum technology value in concentration units of ug/L or mass units of lbs/day. Units determined on a case-by-case basis as appropriate to the particular situation.
(*5) Minimum analytical Quantification Levels (MQL's). Established in a letter dated January 27, 1994 from Wren Stenger of EPA Region 6 to Kilren Vidrine of LDEQ and from the "Permitting Guidance Document for Implementing Louisiana Surface Water Quality Standards". The applicant must test for the parameter at a level at least as sensitive as the specified MQL. If this is not done, the MQL becomes the application value for screening purposes if the pollutant is suspected to be present

on-site and/or in the waste stream. Units are in ug/l or lbs/day depending on the units of the effluent data.

(*6) States whether effluent data is based on 95th percentile estimation. A "1" indicates that a 95th percentile approximation is being used, a "0" indicates that no 95th percentile approximation is being used.

(*7) 95th percentile approximation multiplier (2.13). The constant, 2.13, was established in memorandum of understanding dated October 8, 1991 from Jack Ferguson of Region 6 to Jesse Chang of LDEQ and included in the "Permitting Guidance Document for Implementing Louisiana Surface Water Quality Standards". This value is screened against effluent Water Quality Based Limits established in columns (*18) - (*21). Units are in ug/l or lbs/day depending on the units of the measured effluent data.

(*8) LAC 33.IX.1113.C.6, Table 1, Numerical Criteria for Specific Toxic Substances, freshwater (FW) or marine water (MW) (whichever is applicable) aquatic life protection, acute criteria. Units are specified. Some metals are hardness dependent. The hardness of the receiving stream shall generally be used, however a flow weighted hardness may be determined in site-specific situations. Dissolved metals are converted to Total metals using partition coefficients in accordance with the "Permitting Guidance Document for Implementing Louisiana Surface Water Quality Standards". Similar to hardness, the TSS of the receiving stream shall generally be used, however, a flow weighted TSS may be determined in site-specific situations.

Hardness Dependent Criteria:

Metal	Formula
Cadmium	$e^{(1.1280[\ln(\text{hardness})] - 1.6774)}$
Chromium III	$e^{(0.8190[\ln(\text{hardness})] + 3.6880)}$
Copper	$e^{(0.9422[\ln(\text{hardness})] - 1.3884)}$
Lead	$e^{(1.2730[\ln(\text{hardness})] - 1.4600)}$
Nickel	$e^{(0.8460[\ln(\text{hardness})] + 3.3612)}$
Zinc	$e^{(0.8473[\ln(\text{hardness})] + 0.8604)}$

Dissolved to Total Metal Multipliers for Freshwater Streams (TSS dependent):

Metal	Multiplier
Arsenic	$1 + 0.48 \times TSS^{-0.73} \times TSS$
Cadmium	$1 + 4.00 \times TSS^{-1.13} \times TSS$
Chromium III	$1 + 3.36 \times TSS^{-0.93} \times TSS$
Copper	$1 + 1.04 \times TSS^{-0.74} \times TSS$
Lead	$1 + 2.80 \times TSS^{-0.80} \times TSS$
Mercury	$1 + 2.90 \times TSS^{-1.14} \times TSS$
Nickel	$1 + 0.49 \times TSS^{-0.57} \times TSS$
Zinc	$1 + 1.25 \times TSS^{-0.70} \times TSS$

Dissolved to Total Metal Multipliers for Marine Environments (TSS dependent):

Metal	Multiplier

Copper	$1 + (10^{4.86} \times TSS^{-0.72} \times TSS) \times 10^{-6}$
Lead	$1 + (10^{6.06} \times TSS^{-0.85} \times TSS) \times 10^{-6}$
Zinc	$1 + (10^{5.36} \times TSS^{-0.52} \times TSS) \times 10^{-6}$

If a metal does not have multiplier listed above, then the dissolved to total metal multiplier shall be 1.

(*9) LAC 33.IX.1113.C.6, Table 1, Numerical Criteria for Specific Toxic Substances, freshwater (FW) or marine water (MW) (whichever is applicable) aquatic life protection, chronic criteria. Units are specified. Some metals are hardness dependent. The hardness of the receiving stream shall generally be used, however a flow weighted hardness may be determined in site-specific situations. Dissolved metals are converted to Total metals using partition coefficients in accordance with the "Permitting Guidance Document for Implementing Louisiana Surface Water Quality Standards". Similar to hardness, the TSS of the receiving stream shall generally be used, however, a flow weighted TSS may be determined in site-specific situations.
Hardness dependent criteria:

Metal	Formula
Cadmium	$e^{(0.7852[\ln(\text{hardness})] - 3.4900)}$
Chromium III	$e^{(0.8473[\ln(\text{hardness})] + 0.7614)}$
Copper	$e^{(0.8545[\ln(\text{hardness})] - 1.3860)}$
Lead	$e^{(1.2730[\ln(\text{hardness})] - 4.7050)}$
Nickel	$e^{(0.8460[\ln(\text{hardness})] + 1.1645)}$
Zinc	$e^{(0.8473[\ln(\text{hardness})] + 0.7614)}$

Dissolved to total metal multiplier formulas are the same as (*8), acute numerical criteria for aquatic life protection.

(*10) LAC 33.IX.1113.C.6, Table 1, Numerical Criteria for Specific Toxic Substances, human health protection, drinking water supply (HHDW), non-drinking water supply criteria (HHNDW), or human health non-primarry contact recreation (HHNPCR) (whichever is applicable). A DEQ and EPA approved Use Attainability Analysis is required before HHNPCR is used, e.g., Monte Sano Bayou. Units are specified.

(*11) C if screened and carcinogenic. If a parameter is being screened and is carcinogenic a "C" will appear in this column.

(*12) Wasteload Allocation for acute aquatic criteria (WLAa). Dilution type WLAa is calculated in accordance with the "Permitting Guidance Document for Implementing Louisiana Surface Water Quality Standards". Negative values indicate that the receiving water is not meeting the acute aquatic numerical criteria for that parameter. Units are in ug/L.
Dilution WLAa formulas for streams:

$$WLAa = (Cr/\text{Dilution Factor}) - \frac{(Fs \times Orc \times 0.6463 \times Cu)}{Qe}$$

Dilution WLAa formulas for static water bodies:
WLAa = (Cr-Cu)/Dilution Factor)
Cr represents aquatic acute numerical criteria from column (*8).
If Cu data is unavailable or inadequate, assume Cu=0.

If water quality standards are being applied at end-of-pipe, such as in the case of certain TMDL's, then a blank shall appear in this column.

(*13) Wasteload Allocation for chronic aquatic criteria (WLAc). Dilution type WLAc is calculated in accordance with the "Permitting Guidance Document for Implementing Louisiana Surface Water Quality Standards". Negative values indicate that the receiving water is not meeting the chronic aquatic numerical criteria for that parameter. Units are in ug/L.
Dilution WLAc formula:

$$WLAc = (Cr/\text{Dilution Factor}) - \frac{(Fs \times Qrc \times 0.6463 \times Cu)}{Qe}$$

Dilution WLAc formulas for static water bodies:
WLAc = (Cr-Cu)/Dilution Factor)
Cr represents aquatic chronic numerical criteria from column (*9).
If Cu data is unavailable or inadequate, assume Cu=0.
If water quality standards are being applied at end-of-pipe, such as in the case of certain TMDL's, then a blank shall appear in this column.

(*14) Wasteload Allocation for human health criteria (WLAh). Dilution type WLAh is calculated in accordance with the "Permitting Guidance Document for Implementing Louisiana Surface Water Quality Standards". Negative values indicate that the receiving water is not meeting the human health numerical criteria for that parameter. Units are in ug/L. Dilution WLAh formula:

$$WLAh = (Cr/\text{Dilution Factor}) - \frac{(Fs \times Qrc,Qrh \times 0.6463 \times Cu)}{Qe}$$

Dilution WLAh formulas for static water bodies:
WLAh = (Cr-Cu)/Dilution Factor)
Cr represents human health numerical criteria from column (*10).
If Cu data is unavailable or inadequate, assume Cu=0.
If water quality standards are being applied at end-of-pipe, such as in the case of certain TMDL's, then a blank shall appear in this column.

(*15) Long Term Average for aquatic numerical criteria (LTAa). WLAa numbers are multiplied by a multiplier specified in the "Permitting Guidance Document for Implementing Louisiana Surface Water Quality Standards" which is 0.32. WLAa X 0.32 = LTAa.
If water quality standards are being applied at end-of-pipe, such as in the case of certain TMDL's, then a blank shall appear in this column.

(*16) Long Term Average for chronic numerical criteria (LTAc). WLAc numbers are multiplied by a multiplier specified in the "Permitting Guidance Document for Implementing Louisiana Surface Water Quality Standards" which is 0.53. WLAc X 0.53 = LTAc.
If water quality standards are being applied at end-of-pipe, such as in the case of certain TMDL's, then a blank shall appear in this column.

(*17) Long Term Average for human health numerical criteria (LTAh). WLAh numbers are multiplied by a multiplier specified in the "Permitting Guidance Document for Implementing Louisiana Surface Water Quality Standards" which is 1. WLAc X 1 = LTAh.
If water quality standards are being applied at end-of-pipe, such as in the case of certain TMDL's, then a blank shall appear in this column.

(*18) Limiting Acute, Chronic or Human Health LTA's. The most limiting LTA is placed in this column. Units are consistent with the WLA calculation. If standards are being applied at end-of-pipe, such as in the case of certain TMDL's, then the type of limit, Aquatic or Human Health (HH), is indicated.

(*19) End of pipe Water Quality Based Limit (WQBL) monthly average in terms of concentration, ug/L. If aquatic life criteria was the most limiting LTA then the limiting LTA is multiplied by 1.31 to determine the average WQBL ($LTA_{limiting\ aquatic}$ X 1.31 = $WQBL_{monthly\ average}$). If human health criteria was the most limiting criteria then LTAh = $WQBL_{monthly\ average}$. If water quality standards are being applied at end-of-pipe, such as in the case of certain TMDL's, then either the human health criteria or the chronic aquatic life criteria shall appear in this column depending on which is more limiting.

(*20) End of pipe Water Quality Based Limit (WQBL) daily maxium in terms of concentration, ug/L. If aquatic life criteria was the most limiting LTA then the limiting LTA is multiplied by 3.11 to determine the daily maximum WQBL ($LTA_{limiting\ aquatic}$ X 3.11 = $WQBL_{daily\ max}$). If human health criteria was the most limiting criteria then LTAh is multiplied by 2.38 to determine the daily maximum WQBL ($LTA_{limiting\ aquatic}$ X 2.38 = $WQBL_{daily\ max}$). If water quality standards are being applied at end-of-pipe, such as in the case of certain TMDL's, then either the human health criteria or the acute aquatic life criteria shall appear in this column depending on which is more limiting.

(*21) End of pipe Water Quality Based Limit (WQBL) monthly average in terms of mass, lbs/day. The mass limit is determined by using the mass balance equations above. Monthly average WQBL, ug/l/1000 X facility flow, MGD X 8.34 = monthly average WQBL, lbs/day.

(*22) End of pipe Water Quality Based Limit (WQBL) monthly average in terms of mass, lbs/day. Mass limit is determined by using the mass balance equations above. Daily maximum WQBL, ug/l/1000 X facility flow, MGD X 8.34 = daily maximum WQBL, lbs/day.

(*23) Indicates whether the screened effluent value(s) need water quality based limits for the parameter of concern. A "yes" indicates that a water quality based limit is needed in the permit; a "no" indicates the reverse.

Appendix C

Number of industrial category outfalls: 1

SECTION III – LABORATORY ANALYSIS (cont.)

Outfall Number: 001		Effluent			
Pollutant	Mark "X"	Concentration (ug/L)		Mass (lbs/day)	
		Monthly Average	Daily Maximum	Monthly Average	Daily Maximum
Volatile Organic Chemicals – EPA Method 624 suggested					
acrolein	50	ND	ND	ND	ND
acrylonitrile	50	ND	ND	ND	ND
benzene	10	ND	ND	ND	ND
bromoform	10	ND	ND	ND	ND
carbon tetrachloride	10	ND	ND	ND	ND
chlorobenzene	50	ND	ND	ND	ND
chlorodibromomethane	10	ND	ND	ND	ND
chloroethane	10	ND	ND	ND	ND
2-chloroethylvinyl ether	50	ND	ND	ND	ND
chloroform	10	ND	ND	ND	ND
dichlorobromomethane	10	ND	ND	ND	ND
1,1-dichloroethane	10	ND	ND	ND	ND
1,2-dichloroethane	10	ND	ND	ND	ND
1,1-dichloroethylene	10	ND	ND	ND	ND
1,2-dichloropropane	10	ND	ND	ND	ND
1,3-Dichloropropylene	10	ND	ND	ND	ND
ethylbenzene	10	ND	ND	ND	ND
methyl bromide	50	ND	ND	ND	ND
methyl chloride	50	ND	ND	ND	ND
methylene chloride	20	ND	ND	ND	ND
1,1,2,2-tetrachloroethane	10	ND	ND	ND	ND
tetrachloroethylene	10	ND	ND	ND	ND
toluene	10	ND	ND	ND	ND
1,2-trans-dichloroethylene	10	ND	ND	ND	ND
1,1,1-trichloroethane	10	ND	ND	ND	ND
1,1,2-trichloroethane	10	ND	ND	ND	ND
trichloroethene (trichloroethylene)	10	ND	ND	ND	ND
vinyl chloride (chloroethylene)	10	ND	ND	ND	ND

SECTION III – LABORATORY ANALYSIS (cont.)

Outfall Number:	001	Effluent			
Pollutant	MQL (µg/l)	Concentration (mg/l)		Mass (lbs/day)	
		Monthly Average	Daily Maximum	Monthly Average	Daily Maximum
Acid Extractable Organic Chemicals – EPA Method 625 suggested					
2-chlorophenol	10	N/A	N/A	N/A	N/A
3-chlorophenol	10	N/A	N/A	N/A	N/A
4-chlorophenol	10	N/A	N/A	N/A	N/A
2,3-dichlorophenol	10	N/A	N/A	N/A	N/A
2,4-dichlorophenol	10	N/A	N/A	N/A	N/A
2,5-dichlorophenol	10	N/A	N/A	N/A	N/A
2,6-dichlorophenol	10	N/A	N/A	N/A	N/A
3,4-dichlorophenol	10	N/A	N/A	N/A	N/A
2,4-dimethylphenol	10	N/A	N/A	N/A	N/A
2,4-dinitrophenol	50	N/A	N/A	N/A	N/A
2-methyl 4,6-dinitrophenol (4,6-dinitro-o-cresol)	50	N/A	N/A	N/A	N/A
2-nitrophenol	20	N/A	N/A	N/A	N/A
4-nitrophenol	50	N/A	N/A	N/A	N/A
4-chloro-3-methylphenol (p-chloro-m-cresol)	10	N/A	N/A	N/A	N/A
pentachlorophenol	50	N/A	N/A	N/A	N/A
phenol	10	N/A	N/A	N/A	N/A
2,4,6-trichlorophenol	10	N/A	N/A	N/A	N/A
Base/Neutral Extractable Organic Chemicals – EPA Method 625 suggested					
acenaphthene	10	N/A	N/A	N/A	N/A
acenaphthylene	10	N/A	N/A	N/A	N/A
anthracene	10	N/A	N/A	N/A	N/A
benzidine	50	N/A	N/A	N/A	N/A
benzo(a)anthracene	10	N/A	N/A	N/A	N/A
benzo(a)pyrene	10	N/A	N/A	N/A	N/A
3,4-benzo fluoranthene	10	N/A	N/A	N/A	N/A
benzo(ghi)perylene	20	N/A	N/A	N/A	N/A
benzo(k)fluoranthene	10	N/A	N/A	N/A	N/A
bis(2-chloroethoxy)methane	10	N/A	N/A	N/A	N/A
bis(2-chloroethyl)ether	10	N/A	N/A	N/A	N/A
bis(2-chloroisopropyl)ether	10	N/A	N/A	N/A	N/A

SECTION III – LABORATORY ANALYSIS (cont.)

Outfall Number:	001				
		Effluent			
Pollutant	MQL (ug/l)	Concentration (mg/l)		Mass (lbs/day)	
		Monthly Average	Daily Maximum	Monthly Average	Daily Maximum
bis(2-ethylhexyl)phthalate	10	N/A	N/A	N/A	N/A
4-bromophenyl phenyl ether	10	N/A	N/A	N/A	N/A
butylbenzyl phthalate	10	N/A	N/A	N/A	N/A
2-chloronaphthalene	10	N/A	N/A	N/A	N/A
4-chlorophenyl phenyl ether	10	N/A	N/A	N/A	N/A
chrysene	10	N/A	N/A	N/A	N/A
dibenzo(a,h)anthracene	20	N/A	N/A	N/A	N/A
1,2-dichlorobenzene	10	N/A	N/A	N/A	N/A
1,3-dichlorobenzene	10	N/A	N/A	N/A	N/A
1,4-dichlorobenzene	10	N/A	N/A	N/A	N/A
3,3'-dichlorobenzidine	50	N/A	N/A	N/A	N/A
diethyl phthalate	10	N/A	N/A	N/A	N/A
dimethyl phthalate	10	N/A	N/A	N/A	N/A
di-n-butyl phthalate	10	N/A	N/A	N/A	N/A
2,4-dinitrotoluene	10	N/A	N/A	N/A	N/A
2,6-dinitrotoluene	10	N/A	N/A	N/A	N/A
di-n-octyl phthalate	10	N/A	N/A	N/A	N/A
1,2-diphenylhydrazine (as azobenzene)	20	N/A	N/A	N/A	N/A
fluoranthene	10	N/A	N/A	N/A	N/A
fluorene	10	N/A	N/A	N/A	N/A
hexachlorobenzene	10	N/A	N/A	N/A	N/A
hexachlorobutadiene	10	N/A	N/A	N/A	N/A
hexachlorocyclopentadiene	10	N/A	N/A	N/A	N/A
hexachloroethane	20	N/A	N/A	N/A	N/A
indeno(1,2,3-cd)pyrene	20	N/A	N/A	N/A	N/A
isophorone	10	N/A	N/A	N/A	N/A
naphthalene	10	N/A	N/A	N/A	N/A
nitrobenzene	10	N/A	N/A	N/A	N/A
N-nitrosodimethylamine	50	N/A	N/A	N/A	N/A
N-nitrosodi-n-propylamine	20	N/A	N/A	N/A	N/A
N-nitrosodiphenylamine	20	N/A	N/A	N/A	N/A
phenanthrene	10	N/A	N/A	N/A	N/A

SECTION III – LABORATORY ANALYSIS (cont.)

Outfall Number:	001	Effluent			
Pollutant	MQL (mg/l)	Concentration (mg/l)		Mass (lbs/day)	
		Monthly Average	Daily Maximum	Monthly Average	Daily Maximum
pyrene	10	N/A	N/A	N/A	N/A
1,2,4-trichlorobenzene	10	N/A	N/A	N/A	N/A
Pesticides & PCB's - EPA Method 608 required					
aldrin	0.05	N/A	N/A	N/A	N/A
Aroclor 1016 (PCB-1016)	1.0	N/A	N/A	N/A	N/A
Aroclor 1221 (PCB-1221)	1.0	N/A	N/A	N/A	N/A
Aroclor 1232 (PCB-1232)	1.0	N/A	N/A	N/A	N/A
Aroclor 1242 (PCB-1242)	1.0	N/A	N/A	N/A	N/A
Aroclor 1248 (PCB-1248)	1.0	N/A	N/A	N/A	N/A
Aroclor 1254 (PCB-1254)	1.0	N/A	N/A	N/A	N/A
Aroclor 1260 (PCB-1260)	1.0	N/A	N/A	N/A	N/A
alpha-BHC	0.05	N/A	N/A	N/A	N/A
beta-BHC	0.05	N/A	N/A	N/A	N/A
delta-BHC	0.05	N/A	N/A	N/A	N/A
gamma-BHC	0.05	N/A	N/A	N/A	N/A
chlordane	0.2	N/A	N/A	N/A	N/A
4,4'DDT	0.1	N/A	N/A	N/A	N/A
4,4'DDE	0.1	N/A	N/A	N/A	N/A
4,4'DDD	0.1	N/A	N/A	N/A	N/A
dieldrin	0.1	N/A	N/A	N/A	N/A
alpha-endosulfan	0.1	N/A	N/A	N/A	N/A
beta-endosulfan	0.1	N/A	N/A	N/A	N/A
endosulfan sulfate	0.1	N/A	N/A	N/A	N/A
endrin	0.1	N/A	N/A	N/A	N/A
endrin aldehyde	0.1	N/A	N/A	N/A	N/A
heptachlor	0.05	N/A	N/A	N/A	N/A
heptachlor epoxide	0.05	N/A	N/A	N/A	N/A
Toxaphene	5.0	N/A	N/A	N/A	N/A
2,4-dichlorophenocyacetic acid (2,4-D)	---	N/A	N/A	N/A	N/A
2-(2,4,5-trichlorophenoxy) propionic acid	---	N/A	N/A	N/A	N/A
2,3,7,8-tetrachlorodibenzo-p-dioxin use EPA Method 1613	10 ppq	N/A	N/A	N/A	N/A

SECTION III – LABORATORY ANALYSIS (cont.)

Outfall Number	001	Effluent			
Pollutant	MQL * (mg/l)	Concentration (mg/l)		Mass (lbs/day)	
		Monthly Averages	Daily Maximum	Monthly Averages	Daily Maximum
Metals, Cyanide & Total Phenols					
Antimony, Total	60	ND	ND	ND	ND
Arsenic, Total	10	0.01	N/A	N/A	N/A
Beryllium, Total	5	ND	ND	ND	ND
Cadmium, Total	1	ND	ND	ND	ND
Chromium, Total	10	ND	ND	ND	ND
Chromium, Hexavalent	10	ND	ND	ND	ND
Copper, Total	10	ND	ND	ND	ND
Lead, Total	5	ND	ND	ND	ND
Mercury, Total	0.2	ND	ND	ND	ND
Nickel, Total [Marine]	5	ND	ND	ND	ND
Nickel, Total [Freshwater]	40	ND	ND	ND	ND
Selenium, Total	5	ND	ND	ND	ND
Silver, Total	2	ND	ND	ND	ND
Thallium, Total	10	ND	ND	ND	ND
Zinc, Total	20	0.03	N/A	N/A	N/A
Cyanide, Total	20	ND	ND	ND	ND
Cyanide, Free	--	ND	ND	ND	ND
Phenols, Total	5	ND	ND	ND	ND
Additional Metals if expected to be present - Use EPA Approved Method					
Aluminum, Total		N/A	N/A	N/A	N/A
Barium, Total		N/A	N/A	N/A	N/A
Boron, Total		N/A	N/A	N/A	N/A
Cobalt, Total		N/A	N/A	N/A	N/A
Iron, Dissolved		N/A	N/A	N/A	N/A
Magnesium, Total		N/A	N/A	N/A	N/A
Manganese, Total		N/A	N/A	N/A	N/A
Molybdenum		N/A	N/A	N/A	N/A
Tin, Total		N/A	N/A	N/A	N/A
Titanium, Total		N/A	N/A	N/A	N/A

* Minimum Quantification Level (MQL).

Appendix D

BIOMONITORING FREQUENCY RECOMMENDATION AND RATIONALE FOR ADDITIONAL REQUIREMENTS

Permit Number: **LA0054216**
Facility Name: **Shell Chemical LP – St. Rose Refinery**
Previous Critical Dilution: **0.0055%** Proposed Critical Dilution: **0.006% (10:1 ACR)**
Date of Review: **09/30/05** Name of Reviewer: **Kim Gunderson**

Recommended Frequency by Species:

***Pimephales promelas* (Fathead minnow): Once/Year[1]**
***Daphnia pulex* (water flea): Once/Year[1]**

Recommended Dilution Series: **0.002%, 0.003%, 0.004%, 0.006%, and 0.008%**

Number of Tests Performed during previous 5 years by Species:

***Pimephales promelas* (Fathead minnow): 9**
***Daphnia pulex* (water flea): 5**
***Daphnia magna* (water flea): N/A – Testing of species was not required**
***Ceriodaphnia dubia* (water flea): 1[2]**

Failed Test Dates during previous 5 years by Species:

***Pimephales promelas* (Fathead minnow): No failures on file during the last five years**
***Daphnia pulex* (water flea): No failures on file during the last five years**
***Daphnia magna* (water flea): N/A – Testing of species was not required**
***Ceriodaphnia dubia* (water flea): No failures on file during the last five years**

Previous TRE Activities: **N/A – No previous TRE Activities**

Additional Requirements (including WET Limits) Rationale / Comments Concerning Permitting:

SCOGI, Louisiana Holdings, LLC owns and Shell Chemical, LP operates a petroleum refinery in St. Rose, St. Charles Parish, Louisiana. NPDES Permit LA0054216, effective March 1, 2001, contained freshwater acute biomonitoring as an effluent characteristic of Outfall 001 for *Daphnia pulex* and *Pimephales promelas*. The effluent series consisted of 0.0023%, 0.0031%, 0.0041%, 0.0055%, and 0.007% concentrations. The critical dilution was defined as the 0.0055% effluent concentration. The testing was to be performed once per year for the *Daphnia pulex* and once every six months for the

[1] An acute critical dilution of less than 1% shall have an established monitoring frequency of once/year.
[2] The review of the last five years of biomonitoring history for this recommendation included this test which was conducted in accordance with previously issued NPDES Permit LA0054216, effective November 1, 1994, which required freshwater chronic biomonitoring with a critical dilution of 0.0011% effluent concentration.

Pimephales promelas. Data on file indicate that the permittee has complied with the biomonitoring requirements contained in LA0054216 with no failures in the last five years.

It is recommended that freshwater acute biomonitoring continue to be an effluent characteristic of Outfall 001 in LA0054216. The effluent dilution series shall be 0.002%, 0.003%, 0.004%, 0.006%, and 0.008% concentrations, with 0.006% being the defined critical dilution (the 10:1 Acute-to-Chronic ratio has been implemented because the critical dilution is less than 5%). Since the proposed critical dilution is less than 1% (10:1 ACR), the biomonitoring frequency shall be once per year for *Daphnia pulex* and *Pimephales promelas.*

This recommendation is in accordance with the LDEQ/OES Permitting Guidance Document for Implementing Louisiana Surface Water Quality Standards, EPA Region 6 Post-Third Round Whole Effluent Toxicity Testing Frequencies (Revised June 30, 2000), and the Best Professional Judgement (BPJ) of the reviewer.